

(12) UK Patent Application (19) GB (11) 2 242 358 (13) A

(43) Date of A publication 02.10.1991

(21) Application No 9104935.3	(51) INT CL ⁵ A61K 7/48 7/075 7/13 7/18 7/42
(22) Date of filing 08.03.1991	
(30) Priority data (31) 9005384 (32) 09.03.1990 (33) GB	(52) UK CL (Edition K) A5B BFA BFC BFE BFH B161 B822 B826 CSD DHF D108 D114 D120 D123 D125 D132 D179 D182 D1B B2D
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(54) Cosmetic formulation comprising separate water-in-oil emulsion and carrier phases

(57) A cosmetic formulation comprising a cosmetically acceptable carrier immiscibly combined with a water-in-oil emulsion comprising an aqueous phase dispersed within an oil phase by means of an emulsifying agent wherein a component capable of interaction with an ingredient of the carrier is incorporated within the aqueous phase of the emulsion. The cosmetic carrier comprises an aqueous gel, an oil-in-water emulsion, an anhydrous paste or an anionic surfactant phase. Exemplified formulations comprise skin and hair products and a tooth paste.

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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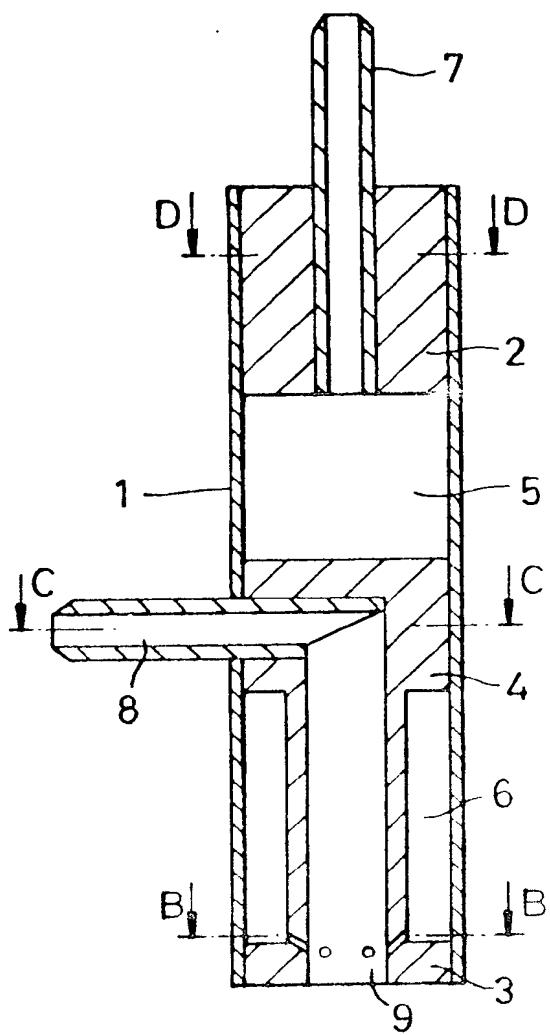


Fig. 1

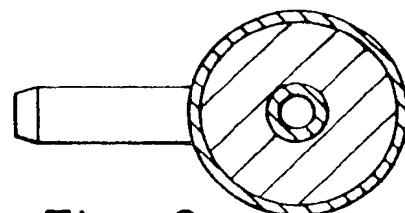


Fig. 2

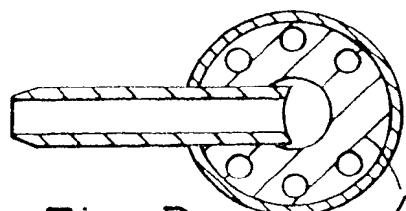


Fig. 3

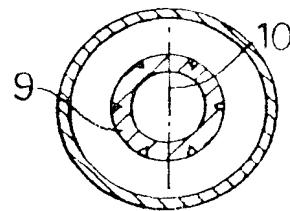


Fig. 4

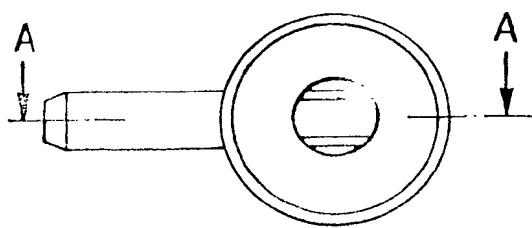


Fig. 5

Cosmetic Formulation

This invention relates to cosmetic formulations including compositions for topical application and preparations for use in personal hygiene.

5 In cosmetic formulations, it is usual to present cosmetic ingredients in a cosmetically acceptable carrier. However, some substances useful in cosmetic formulations may interact with other substances. Therefore difficulties may be encountered in combining
10 certain ingredients into a single formulation. In certain applications this interaction may be desirable at the site of action but undesirable during manufacture or storage, for example in a hair dye preparation containing a dye and an oxidising agent.
15 In other applications this interaction may be undesirable due to the incompatibility of the cosmetically acceptable carrier and a substance which is required in the composition. For example, it is known that certain hydrophilic ionic substances, for
20 example sodium chloride or sodium pyrrolidone carboxylate, contribute to the break down of some gel formulations. It would be desirable if means were available to present interactive components in the same formulation while ensuring that the desired reaction
25 only occurred at the site of action and not prematurely for example during manufacture or storage. Thus it is desirable to provide a formulation in which components capable of interacting are presented in a single formulation which is stable on storage.

30 Accordingly, the present invention provides a cosmetic formulation comprising a cosmetically acceptable carrier immiscibly combined with a water-in-oil emulsion comprising an aqueous phase dispersed within an oil phase by means of an emulsifying agent

wherein a component capable of interaction with an ingredient of the carrier is incorporated within the aqueous phase of the emulsion.

We have now found that if a component capable of interacting with an ingredient of the cosmetically acceptable carrier is incorporated within the aqueous phase of a water-in-oil emulsion, a formulation is provided which is stable on storage. The formulation may be prepared by firstly incorporating the component capable of interacting with an ingredient of the carrier in the aqueous phase of the emulsion and then adding the emulsion to the carrier to form an immiscible mixture. Although the emulsion and the cosmetically acceptable carrier are immiscibly combined during manufacture and storage, the two components are formulated in such a way that on application to a desired surface, for example by applying pressure such as gentle rubbing, mixing of the emulsion and carrier occurs to give a cosmetically acceptable feel.

The present invention allows a significant increase to be made in the range of cosmetic formulations available by enabling the use of previously incompatible or interactive mixtures of excipients. An additional advantage is that all the necessary cosmetic benefits required in a particular situation may be provided in one formulation whereas prior to this invention two or more formulations would have been required. Also the present invention significantly increases the available range of isotonic formulations, which help reduce irritancy. Other advantages of the present invention are that the formulations have an aesthetically pleasing visual appearance and an agreeable cosmetic feel.

In the present invention certain components contained in the aqueous phase of the water-in-oil emulsion would have an undesirable effect on the cosmetic carrier, for example sodium chloride although 5 beneficial in providing isotonic compositions would break down a cosmetic carrier comprising a neutralised carboxyvinyl polymer gel. Examples of components in this category are salts for example sodium chloride, sodium pyrrolidone carboxylate, sodium fluoride, anti- 10 dandruff agents for example zinc pyrithione, and cationic conditioners for example polyquaternium-6. Other substances may affect the clarity of the gel giving the formulation an unsatisfactory appearance, for example ultraviolet absorbers, for example octyl 15 methoxy cinnamate and butyl methoxydibenzoyl methane.

With other components it is desirable to have an interaction between the component in the water-in-oil emulsion and the ingredient in the cosmetic carrier but only at the site of action and not during the 20 manufacture or storage of the formulation. Pairs of substances in this category are an oxidising agent and a reducing agent for example hydrogen peroxide solutions and sodium metabisulphite; an enzyme and its substrate for example glucose oxidase and glucose; an 25 acid and a base, the components of an effervescent couple for example citric acid and sodium bicarbonate; an anionic surfactant and a cationic conditioner, and an oxidising agent and a dyestuff.

In formulations of the present invention the term 30 water-in-oil emulsion includes water-in-silicone emulsions. The oil phase of the water-in-oil emulsion comprises one or more cosmetically acceptable oils for example vegetable oils, synthetic esters, mineral oils, volatile silicone oils or non-volatile silicone oils.

Preferably the oil phase comprises non-polar oils, most preferably liquid paraffin. Suitably the oil phase of the water-in-oil emulsion comprises up to 90%, for example 10-90%, preferably 15-60%, most preferably 5 20-40%.

Preferred formulations of the present invention are those in which the water content of the water-in-oil emulsion comprises 10-90%, preferably 40-85%, and more preferably 60-80%. The ratio of water to oil in 10 the water-in-oil emulsion may be in the range 6:1 to 1:6, preferably 5:1 to 1:2, and in especially preferred compositions the water content forms more than half of the water-in-oil emulsion, for example 4:1 to 1:1. Formulations which have a high water content 15 in the emulsion are particularly advantageous as this provides for rapid mixing with the cosmetic carrier on application to a desired site giving rise to an agreeable cosmetic feel. Additionally a high water content allows the use of higher quantities of ionic components which are incompatible with the cosmetic 20 carrier.

In formulations according to the present invention, the water-in-oil emulsion contains an emulsifying agent. The emulsifying agent may be a 25 single emulsifier or it may be a mixture of emulsifiers. Suitable emulsifiers are:

polysiloxane-polyalkyl-polyether copolymers for example that supplied under the trade name Abil EM 90 by TH Goldschmidt; lauryl-methicone copolyol (available under 30 the trade name Q2-5200 from Dow Corning); cetyl dimethicone copolyol (available from TH Goldschmidt AG under the trade name AB WS 08 in admixture with cetyl dimethicone, polyglyceryl-3 oleate and hexyl laurate as co-emulsifiers and under the trade name ABIL WE 09 in

admixture with polyglyceryl-4 isostearate and hexyl laurate as co-emulsifiers);

ethoxylated fatty acid esters for example PEG-1
glyceryl oleostearate (available under the trade name
5 Arlacel 581 from ICI Speciality Chemicals), PEG-1
glyceryl sorbitan isostearate (available under the
trade name Arlacel 582 from ICI Speciality Chemicals),
polyglycerin oleate (available under the trade name
10 Cremaphor GO32 from BASF), polyglycerin-2-sesquioleate
Hostacerin WO and Hostacerin DGO from Hoechst), or polyglycerin-2-sesqui-
isostearate (available under the trade name HOE S2721
from Hoechst);

fatty acid phosphates for example trioleylphosphate
15 (available under the trade name Hostaphat KO 300N from
Hoechst);

sorbitan fatty acid esters for example sorbitan
monooleate, sorbitan sesquioleate, sorbitan trioleate,
sorbitan monoisostearate (available under the trade
20 names Arlacel 80, Arlacel 83, Arlacel 85 and Arlacel
987 respectively from ICI Speciality Chemicals);

ethoxylated hydrogenated castor oil (available under
the trade name Arlacel 989 from ICI Speciality
Chemicals);

25 fatty acid esters of polyalcohols for example that
supplied in admixture with a beeswax derivative under
the trade name Apifac by Gattfosse;

glycerol sorbitan fatty acid esters for example
glycerol sorbitan isostearate and glycerol sorbitan
30 oleostearate (available under the trade names Arlacel

986 and Arlacel 481, respectively, from ICI Speciality Chemicals);

and PPG-3 myristylether (available under the trade name Witconol APM from Witco Chemicals).

5 Preferably the emulsifier is a polysiloxane-polyalkyl-polyether copolymer. Most preferably the emulsifier is laurylmethicone copolyol. Suitably the emulsifying agent comprises up to 15%, for example 0.5-15%, of the water-in-oil emulsion, preferably 1-5%
10 and most preferably 1-3%.

The term cosmetically acceptable carrier is used herein to describe a vehicle to carry or support the cosmetic ingredients which are to be applied to a desired surface. Such vehicles may be of varying
15 degrees of viscosity and may include aqueous or non-aqueous carriers to which a gelling agent may be optionally added to give an aqueous or a non-aqueous gel; oil-in-water emulsions or anhydrous pastes. The term cosmetic carrier also covers anionic surfactant
20 phases.

In formulations where the cosmetic carrier comprises an aqueous gel, a suitable gelling agent comprises a carboxy vinyl polymer in combination with a neutralising agent. Other suitable gelling agents
25 comprise sodium magnesium silicate (available under the trade name Laponite from Laporte Industries); polyglycerylmethacrylate (available under the trade name Lubragel MS from Guardian Chemicals as an aqueous mixture with propylene glycol, propyl 4-hydroxybenzoate
30 and methyl 4-hydroxybenzoate); a gel-forming gum for example xanthan gum, guar gum, carageenan gum, locust bean gum and cellulose gum. Suitable carboxy vinyl polymers are available from B F Goodrich Chemical

Company under the trade name Carbopol. Preferred gelling agents are: a carboxy vinyl copolymer in combination with a neutralising agent; polyglycerylmethacrylate; sodium magnesium silicate and 5 cellulose gum. The preferred carboxy vinyl polymer for use in a formulation according to the present invention is Carbopol 940.

The neutralising agent employed in combination with the carboxy vinyl polymer causes the carboxy vinyl 10 polymer to thicken and form a gel having an adequate consistency. Any suitable compound which combines with the carboxy vinyl polymer to increase the viscosity of the composition may be employed. Suitable neutralising agents comprise inorganic bases for example potassium 15 hydroxide or sodium hydroxide and organic bases for example amines for example triethanolamine. Preferably the neutralising agent is potassium hydroxide.

Suitably in formulations of the present invention, the gelling agent comprises up to 30% of the cosmetic 20 carrier, for example 0.01-30%, preferably 0.1-5%, most preferably 0.5-3%.

Other cosmetic carriers suitable for use in the present invention comprise oil-in-water emulsions comprising an oil phase, water and an emulsifying 25 agent. The oil phase comprises an oil component which comprises one or more cosmetically acceptable oils for example vegetable oils, synthetic esters and mineral oils and may optionally contain a volatile and/or a non-volatile silicone oil. Suitably the oil phase of 30 the oil-in-water emulsion comprises up to 70%, for example 1-70%, preferably 20-50%, most preferably 25-45%.

The emulsifying agent for the oil-in-water emulsion may be a single emulsifier or it may be a mixture of emulsifiers. Suitable emulsifiers are:

5 fatty acid esters for example glyceryl monostearate (available under the trade name Monostearin NSE from Quest);

10 ethoxylated fatty acid esters for example Steareth-2 and Steareth-21 (available under the trade names Brij 72 and Brij 721, respectively, from ICI Speciality Chemicals) and PEG-5 stearyl stearate (available under the trade name Arlatone 983S from ICI Speciality Chemicals);

ethoxylated fatty alcohols for example cetomacrogol.

15 hydrogenated tallow glycerides citrate (available under the trade name Grindtek CAP from Grindsted);

fatty acid quaternary ammonium salts for example behenyl trimethyl ammonium methosulphate;

and salts of fatty acids for example sodium stearate or sodium ceteostearyl sulphate.

20 Suitably the emulsifier comprises up to 20%, for example 0.1-20% of the oil-in-water emulsion, preferably 0.5-10%, most preferably 1-5%.

Another suitable cosmetic carrier for use in the present invention comprises an anhydrous paste comprising a cosmetically acceptable oil as hereinbefore defined, an oil thickening agent, a water soluble component suspended in said oil, at least one wetting agent and optionally a film forming agent.

The cosmetic carrier may also comprise an anionic surfactant phase comprising an anionic surfactant, water and a thickening agent. Suitable anionic surfactants are salts of ethoxylated fatty alcohol sulphates and salts of alkyl sulphates. Suitably the anionic surfactant comprises 0.1-25% of the anionic surfactant phase, preferably 1-20% and most preferably 5-15%. Suitable thickening agents are salts for example magnesium chloride; alkanolamides, for example coconut diethanolamide; and ethoxylated alcohols lauryl alcohol 3EO. The amount of thickening agent will vary according to the type of thickening agent used and the viscosity required. Suitably the thickening agent comprises 0.1-5% of the anionic surfactant phase preferably 0.5-2%. The anionic surfactant phase may optionally contain foam stabilisers, perfumes, colourants and preservatives.

In formulations of the present invention the ratio of the water-in-oil emulsion to cosmetic carrier is in the range 99:1 to 1:99, preferably 75:1 to 1:75, most preferably 50:1 to 1:50 and especially preferably 25:1 to 1:25. Suitably the water-in-oil phase comprises up to 99% of the formulation, preferably 0.1 to 75%, most preferably 5-50% and especially preferably 10-25%.

Cosmetic formulations of the present invention include compositions for topical application and use in personal hygiene. For example:

skin care products, including eye care products, liposome products, barrier products, antiperspirant gels and anti-acne gels, which may contain: conditioners for example evening primrose oil; moisturisers for example sodium pyrrolidone carboxylate; humectants for example butylene glycol, glycerine, sorbitol; skin lightener for example

- magnesium ascorbyl phosphate; herbal extracts; vitamins, for example vitamin A palmitate;
- 5 sunscreen formulations which comprise an ultraviolet absorber for example octyl methoxy cinnamate, butyl methoxy dibenzoyl methane, ethoxylated β -aminobenzoic acid ester and benzophenone or a sunscreen for example microfine titanium dioxide;
- 10 hair products for example: anti-dandruff formulations comprising anti-dandruff agents for example zinc Pyrithione; anionic conditioning shampoos comprising a conditioner for example ethoxylated glyceryl laurate; anionic medicated shampoos comprising an antiseptic agent for example chlorhexidine gluconate; hair conditioning gels comprising a conditioner for example polyquaternium-6; or hair dyes; and cream bleaches;
- 15 oral hygiene products for example toothpastes including fluoride toothpastes and remineralising toothpastes for sensitive teeth which may contain dental abrasives for example calcium carbonate or silica; flavourings and sweeteners for example sodium saccharin;
- 20 toiletries for example soaps with antiseptic moisturising cream, conditioning and antiseptic liquid "soaps" which may contain conditioners, antiseptic agents, foam stabilisers; and effervescent bath products comprising an effervescent couple for example citric acid and sodium bicarbonate;
- 25 Formulations of the present invention may optionally contain other cosmetically acceptable ingredients which are well known in the art such as pH regulators for example sodium hydroxide, di-isopropanolamine, citric acid; thickeners; perfumes; salts; conditioners; colourants; cooling agents for

example ethanol; volatile silicones for example volatile dimethicone fluids and volatile cyclomethicone fluids; anti-oxidants for example butylated hydroxytoluene; non-volatile silicones, for example non-volatile dimethicone fluid; film forming agents for example polyvinylpyrrolidone; stabilisers; bleaching agents; wetting agents; pearlisers; opacifiers; humectants; vitamins, moisturisers and heavy metal sequestering agents for example the disodium salt of ethylene diaminetetraacetic acid.

In another aspect the present invention provides a process for the preparation of the formulations as hereinbefore described in which the cosmetic carrier and the water-in-oil emulsion are combined suitably by admixing, to form an immiscible mixture. Preferably the admixing is carried out by injection of one phase into the other and most preferably by co-extrusion through a suitable filling head wherein the ratios of the two components may be varied, including computer controlled filling machines. The product obtained by this process may be striped or marbled or may be in the form of a geometric pattern or layered.

In yet another aspect the invention provides a method of formulating a cosmetic composition comprising 25 a cosmetically acceptable carrier and a water-in-oil emulsion comprising an aqueous phase, an oil phase, and a component capable of interaction with an ingredient of the carrier wherein the component capable of interaction with the ingredient of the carrier is incorporated in the aqueous phase of the emulsion and further wherein the emulsion is immiscibly combined 30 with the carrier.

On a laboratory scale the cosmetic carrier and the emulsion phase may be combined using a Wiko Stripe

Dispenser of the type normally used for the production of striped toothpastes.

On a larger scale the cosmetic carrier and the emulsion phase are combined by pumping them through the filling head illustrated by way of example in Figures 1-5. In the accompanying drawings:-

Figure 1 is a sectional view of the filling head.

Figure 2 is a sectional view on line DD.

Figure 3 is a sectional view on line CC.

Figure 4 is a sectional view on line BB.

Figure 5 is a plan view of the filling head.

The illustrative filling head comprises a tubular body portion (1) comprising a first end portion (2), a second end portion (3) and an internal perforated annular collar (4) defining internally a first chamber (5) and a second chamber (6) wherein said first end portion (2) is adapted to receive an inlet pipe (7) and the collar is adapted to receive an inlet pipe (7) and pipe (8) wherein said feed pipe is adapted to receive a perforated filling ring (9) said filling ring adapted to allow access from the second chamber into the feed pipe.

In operation the water in-oil emulsion is pumped through the inlet pipe (7) and passes into the first chamber (5) from which it passes into the second chamber (6) via the perforations in the annular collar (4). From the second chamber it passes into the feed pipe via the perforations in the filling ring (9) where it forms a stripe in the cosmetic carrier which is

pumped through the feed pipe (8) and through the centre of the filling ring (10). Alternatively the water-in-oil emulsion may be pumped through the feed (8) and the cosmetic carrier pumped through the inlet 5 pipe (7).

The composition and appearance of the product may be varied by altering the rate at which the two components of the product enter the filling head and the number and size of the holes in the filling ring. 10 The appearance can also be altered by rotating the filling head, or the container into which the formulation is dispersed, at different speeds.

The invention is illustrated by the following non-limitative examples. The percentages quoted are by 15 weight of the compositions.

In the examples sodium pyrrolidone carboxylate is supplied as a 50% solution in water under the trade name Ajidew N50 by Ajinomoto; acrylates copolymer is supplied under the trade name Polytrap Q5-6603 by Dow 20 Corning; a liposome from soya lecithin containing vitamin A palmitate is supplied under the trade name Dermasome RP by Brooks Industries; the tetrasodium salt of ethylenediamine tetraacetic acid is supplied under the trade name Sequestrene Na4 by Ciba-Geigy; 25 octyl methyl cinnamate is supplied under the trade name Parsol MCX by Givaudan; butyl methoxydibenzoyl methane is supplied under the trade name Parsol 1789 by Givaudan; ethoxylated p-aminobenzoic acid ester is supplied under the trade name Lusantan 25 by BASF; 30 dimethicone fluid is supplied under the trade name Silicone Fluid F111/100 by Rhone-Poulenc; an 80% soluti of acrylamide and dimethyldiallylammonium chloride is supplied under the trade name Merquat S by Merck; Benzophenone-4 is supplied under the trade name

Uvinul MS40 by BASF; ethoxy 20 oleyl ether is supplied under the trade name Volpo 020 by Croda; zinc pyrithione is supplied under the trade name Zinc Pyrion SP by Pyrion-Chemie; the polyvinylpyrrolidone/5 hexadecene copolymer is supplied under the trade name Antaron V216 by GAF; Polysorbate 20 is supplied under the trade name Tween 20 by ICI; sorbitan laurate is supplied under the trade name Span 20 by ICI; a mixture of mineral oil, Quaternium 18 Hectorite and Propylene Carbonate is supplied under the trade name Bentone Gel M10 by NL Chemicals; a mixture of glyceryl10 tribehenate and calcium behenate is supplied under the trade name Syncrowax HRSC by Croda; hydroxypropyl methylcellulose is supplied under the trade name Methocel J5MS by Dow; PEG-2 oleammonium chloride and isopropyl alcohol is supplied under the trade name Ethoquad 0/12 by Armak; an aqueous solution of a styrene/polyvinylpyrrolidone copolymer is supplied under the trade name Antara 430 by GAF; the disodium15 salt of ethylenediamine tetra acetic acid is supplied under the trade name Sequestrene Na2 by Ciba-Geigy; polyquaternium-6 is supplied under the trade name Merquat 100 by Merck; coconut diethanolamide is supplied under the trade name Empilan CDE by Albright and Wilson; a mixture of sodium lauryl ether sulphate,20 coconut diethanolamide and ethylene glycol monostearate and a pearling agent is supplied under the trade name Tensiorex BND 57 by Tensia Ltd; a mixture of quaternium-18 and isopropyl alcohol is supplied under the trade name Arquad 2HT by Armak; sodium magnesium25 silicate is supplied under the trade name Laponite XLS by Laporte Industries; a mixture of polyglycerylmethacrylate, propylene glycol, propyl p-hydroxybenzoate, methyl p-hydroxybenzoate in water is supplied under the trade name Lubragel MS by Guardian30 Chemicals; a polyvinylpyrrolidone/vinyl acetate copolymer is supplied under the trade name Luviskol VA35

64 by BASF; a mixture containing sodium dioctyl sulphosuccinate, ethanol and water is supplied under the trade name Empimin OT by Albright and Wilson; cocoamidopropyl betaine is supplied under the trade
5 name Empigen BS by Albright and Wilson; 8 molar ethoxylated glyceryl laurate is supplied under the trade name Glycerox L8 by Croda; a mixture of cyclomethicone and dimethicone copolyol is supplied under the trade name Dow Corning 3225-C by Dow Corning;
10 cyclomethicone is supplied under the trade name Dow Corning 345 by Dow Corning; under the trade name Arlacel 986 by ICI; a mixture of caprylic triglyceride and capric triglyceride is supplied under the trade name Miglyol 810 by Huls UK; hydroxyethyl cellulose is
15 supplied under the trade name Natrosol 250HR by Hercules; a mixture of cetearyl alcohol and ceteareth
20 is supplied under the trade name Lexemul CS20 NA by Van Dyke; Trilaurin is supplied under the trade name Softisan 100 by Huls UK; and microfine Titanium Dioxide
25 is available from Degussa under the trade designation P25 and from Teikoku Kako Co. Ltd. under the trade designation MT 150W, MT 600B or MT 500B.

Examples 1-10 were prepared as shown below.

Example 1 (Eye Care Product) .

Emulsion Phase

	%
5 Laurylmethicone Copolyol (Dow Corning Q2 5200)	2.0
Glycerol sorbitan isostearate (Arlacel 986)	0.5
Light Liquid Paraffin WOM 14	18.0
Evening Primrose Oil	2.0
10 Magnesium Ascorbyl Phosphate	2.0
Sodium pyrrolidone carboxylate (Ajidew N50)	2.0
Sodium Chloride	0.9
Herbal Extract Witch Hazel NA 62	2.0
Extract of Arnica	0.5
15 Vitamin A Palmitate	0.15
Polytrap Q5-6603	0.1
Bronopol	0.03
Purified Water BP	to 100

1) The oil phase containing the laurylmethicone copolyol, the glycerol sorbitan isostearate, the liquid paraffin and the Evening primrose oil was heated to 65-70°C.

2) The magnesium ascorbyl phosphate, sodium pyrrolidone carboxylate, sodium chloride were dissolved in water (approximately 95%) and heated to 50-60°C.

3) The water phase was added slowly to the oil phase with homogenisation. The first 20% of the water phase was added very slowly in order to achieve a satisfactory emulsion. Homogenisation was continued for 5 minutes after the addition of the water phase.

- 4) The product was cooled to 25-30°C with stirring.
- 5) The Bronopol, the Witch Hazel Extract and the Extract of Arnica were added as a solution in the minimum amount of water, with stirring.
- 5 6) Vitamin A Palmitate was entrapped in Polytrap Q5-6603 and then added to the product with stirring until the product was homogenous. The product was made up to weight with water.

	<u>Gel Phase</u>	%
10	Carbopol 940	1.0
	Butylene Glycol	2.0
	Glycerin	1.0
	Sequestrene Na4	0.02
	Potassium Hydroxide	0.35
15	D-Panthenol 75L	1.5
	Bronopol	0.03
	Methyl 4-Hydroxybenzoate	0.15
	Purified Water BP	to 100

- 1) The methyl 4-hydroxybenzoate was added to the butylene glycol and glycerin and the mixture heated to 60°C to form a solution which was then stirred into cold water (approximately 90% of the total water).
- 2) The Sequestrene Na4, Bronopol and D-Panthenol 75L were added in turn to this aqueous solution, with stirring after each addition to ensure that each ingredient dissolved.
- 3) The Carbopol 940 was added and the mixture dispersed with an homogeniser for 10-30 minutes.

- 4) The potassium hydroxide was dissolved in the minimum amount of cold water and added to the mixture which was homogenised for 15 minutes.
- 5) The mixture was made up to weight with water.
- 5 The emulsion phase forms the stripe.

Example 2 (Liposome Product)

	<u>Emulsion Phase</u>	%
	Dow Corning Q2 5200 (lauryl methicone Copolyol)	2.0
	Arlacel 986 (Glyceryl sorbitan isostearate)	0.5
10	Light Liquid Paraffin WOM 14	18.0
	Evening Primrose Oil	2.0
	Sodium Chloride	2.0
	Bronopol	0.03
	Purified Water BP	to 100

- 15 The emulsion phase was prepared in a similar manner to Example 1. The first four ingredients formed the oil phase and sodium chloride and Bronopol were dissolved in water as in Example 1.

<u>Gel Phase</u>		%
	Carbopol 940	1.0
	Methyl 4-Hydroxybenzoate	0.15
	Butylene Glycol	2.0
5	Glycerin	1.0
	D-Panthenol 75L	1.5
	Bronopol	0.03
	Potassium Hydroxide	0.35
	FD & C Blue No1 1% soln	0.05
10	Sequestrene Na4	0.02
	Dermasome RP	1.0
	Purified Water BP	to 100

The gel phase was prepared as described in Example 1 except that after stage 4 the additional ingredients,
15 i.e. FD and C Blue No. 1 solution and Dermasome RP were added before making up to the weight.

Either phase may form the stripe.

Example 3 (Sunscreen Gel)

<u>Emulsion Phase</u>		%
20	Dow Corning Q2 5200 (lauryl methicone Copolyol)	2.0
	Arlacel 986 (Glyceryl sorbitan isostearate)	0.5
	Light Liquid Paraffin WOM 14	18.0
	Evening Primrose Oil	2.0
	Sodium Chloride	2.0
25	Bronopol	0.03
	Parsol MCX	4.0
	Parsol 1789	3.0
	Purified Water BP	to 100

The emulsion phase was prepared as described in Example 2. The Parsol MCX and Parsol 1789 were added to the oil phase and the sodium chloride was added to the aqueous phase prior to mixing.

	<u>Gel Phase</u>	%
	Carbopol 940	1.0
	Methyl Hydroxybenzoate	0.15
	Butylene Glycol	2.0
	Glycerin	1.0
10	D-Panthenol 75L	1.5
	Bronopol	0.03
	Potassium Hydroxide	0.35
	Lusantan 25	5.0
	Denatured Ethanol	5.0
15	FD & C Orange No. 4 1% solution	0.1
	Sequestrene Na4	0.02
	Purified Water BP	to 100

The gel phase was prepared as described in Example 1 except that after Stage 4 the Lusantan 25, denatured ethanol and FD and C Orange No. 4 solution were added respectively, with stirring, before making up to the weight.

The emulsion phase may form the stripe.

Example 4 (Barrier Gel)

	<u>Emulsion Phase</u>	%
	Dow Corning Q2 5200 (lauryl methicone Copolyol)	2.0
	Arlacel 986 (Glyceryl sorbitan isostearate)	0.5
5	Light Liquid Paraffin WOM 14	18.0
	Evening Primrose Oil	2.0
	Sodium Chloride	2.0
	Bronopol	0.03
	Silicone Fluid F111/100	2.0
10	Purified Water BP	to 100

The emulsion phase was prepared in a similar manner to that described in Example 1 with the silicone added to oil phase.

	<u>Gel Phase</u>	%
15	Carbopol 940	1.0
	Methyl 4-hydroxybenzoate	0.15
	Butylene Glycol	2.0
	Glycerin	1.0
	D-Panthenol 75L	1.5
20	Bronopol	0.03
	Potassium Hydroxide	0.35
	FD & C Blue No 1 1% soln	0.05
	Sequestrene Na4	0.02
	Lusantan 25	5.0
25	Merquat S	0.25
	Purified Water BP	to 100

The gel phase was prepared as described in Example 1 except that after Stage 4 the FD and C Blu- No. 1 solution, Lusantan 25 and Merquat S were added respectively, with stirring, before making up to the weight.

Emulsion forms stripe in product.

Example 5 (Remineralising Toothpaste for Sensitive Teeth)

<u>Gel Phase</u>		%
5	Sorbitol	25.0
	Sodium Saccharin	0.2
	Silica	22.5
	Cellulose Gum	0.5
	Sodium methyl cocyl taurate	1.19
10	PEG 400	3.0
	Strontium Chloride hexahydrate	10.0
	Colour	q.s.
	Flavour	1.0
	Methyl 4-hydroxybenzoate	0.1
15	Purified Water	to 100

<u>Emulsion Phase</u>		%
	Dow Corning Q2 5200	(O) 2.00
	Light Liquid Paraffin WOM 14	(O) 20.00
	Sodium fluoride	(W) 0.25
20	Sodium chloride	(W) 1.5
	Preservatives	q.s.
	Purified Water	to 100

The emulsion phase forms the stripe in the product.

Example 6 (Day Cream Gel)

	<u>Emulsion Phase</u>	%
	Dowing Corning 3225-C	(O) 12.0
	Dow Corning 345	(O) 8.0
5	Arlacel 481	(O) 3.0
	Softisan 100	(O) 2.0
	White Soft Paraffin M080 AB & L	(O) 7.50
	Miglyol 810	(O) 5.0
	Sodium Citrate	(W) 1.0
10	Ajidew N50	(W) 1.0
	Butylene Glycol	(W) 5.0
	Glycerin	(W) 2.0
	Bronopol	0.03
	Purified Water BP	to 100
15	The emulsion phase was prepared in a similar manner to that described in Example 1. Components of the oil phase are indicated by (O) and components of the aqueous phase are indicated by (W).	

	<u>Gel Phase</u>	%
20	Carbopol 940	1.0
	Butylene Glycol	2.0
	Glycerin	1.0
	Sequestrene Na4	0.02
	Potassium Hydroxide	0.35
25	D-Panthenol 75L	1.50
	Bronopol	0.03
	Methyl Hydroxybenzoate	0.15
	Purified Water BP	to 100

30 The gel phase was prepared in a similar manner to that described in Example 1.

The emulsion phase will form the stripe in the product.

Example 7 (Anionic Medicated Shampoo)

%

<u>Surfactant Phase</u>		
	Magnesium Lauryl Ether Sulphate 3EO	37.0
5	Empigen BS	8.0
	Citric Acid	0.025
	Glycerox L8	1.0
	Bronopol	0.02
	Magnesium Chloride	q.s.
10	Purified Water	to 100

Emulsion Phase

%

	Dow Corning Q2 5200	(O)	2.0
	Light Liquid Paraffin WOM 14	(O)	20.0
	Sodium Chloride	(W)	2.0
15	Chlorhexidine Gluconate	(W)	0.5
	Preservative		q.s.
	Purified Water		to 100

The two phases appear as layers in the product.

Example 8 (Moisturising Night Cream)

20	<u>W/O Emulsion Phase</u>		%
	Dow Corning Q2 5200	(O)	2.0
	Light Liquid Paraffin WOM 14	(O)	20.0
	Sodium Chloride	(W)	2.0
	Preservative		q.s.
25	Purified Water		to 100

O/W Emulsion Phase

		%
	Natrosol 250 HR	0.5
	Glycerin	1.0
	Butylene Glycol	2.0
5	Ajidew N50	0.5
	Glyceryl Monostearate	2.6
	Lexemul CS 20 NA	2.1
	Softisan 100	1.5
	Artificial Sebum	5.0
10	Shea Butter	1.0
	White Soft Paraffin	5.0
	Peach Kernel Oil	0.5
	Butylated Hydroxytoluene	0.02
	D-Panthenol 75L	1.0
15	Bronopol	0.03
	Purified Water	to 100

Either phase can form the stripe.

Example 9 (Moisturising Gel with Cream)

	<u>Emulsion Phase</u>		%
20	Dow Corning Q2 5200	(O)	2.0
	Light Liquid Paraffin WOM 14	(O)	20.0
	Sodium Chloride	(W)	2.0
	Preservative		q.s.
	Purified Water		to 100

	<u>Gel Phase</u>	%
	Lubragel DV	20.0
	Butylene Glycol	4.0
	Glycerin	2.0
5	D-Panthenol 75L	1.5
	Preservative	q.s.
	Purified Water	to 100
	The emulsion phase forms the stripe in the product.	
	<u>Example 10 (Conditioning Liquid Soap)</u>	
10	<u>Surfactant Phase</u>	%
	Sodium Lauryl Ether Sulphate 2EO	40-45
	Citric Acid	0.05
	Empilan CDE	2.0
	Tensiorex BND 57	1.0
15	Formaldehyde Soln BP	0.035
	Bronopol	0.02
	Colour	q.s.
	Perfume	q.s.
	Purified Water	to 100
20	<u>Emulsion Phase</u>	%
	Dow Corning Q2 5200	(O) 2.0
	Light Liquid Paraffin WOM 14	(O) 20.0
	Sodium Chloride	(W) 2.0
	Arquad 2HT	(O) 0.5
25	Preservative	q.s.
	Purified Water	to 100

The two phases appear as layers in the product.

Examples 11-18 may be prepared as follows. In each case the water-in-oil emulsion phase may be prepared in a similar manner to that described in Example 1. The components of each phase prior to forming the
5 water-in-oil emulsion are indicated by (O) for the components of the oil phase and (W) for the components of the aqueous phase. The other phase in each example, apart from the water-in-oil emulsion, may be prepared by methods known to those skilled in the art.

10 Example 11 (Anti-Dandruff Gel)

Gel Phase

	Sequestrene Na2	0.05
	Carbopol 940	0.5
	Uvinul MS40 Powder	0.02
15	Dowicil 200	0.05
	Di-isopropanolamine Aqueous 90%	0.361
	Methyl 4-Hydroxybenzoate	0.1
	Polyvinylpyrrolidone K30-35	1.5
	Volpo 020	1.0
20	Perf Comp SN 11095 Gidan	0.075
	Purified Water BP	to 100

Emulsion Phase

	Dow Corning Q2 5200	(O)	2.0
	Light Liquid Paraffin WOM 14	(O)	18.0
25	Sodium Chloride	(W)	2.0
	Zinc Pyrion SP		1.06
	Purified Water BP		to 100

The Zinc Pyrion SP may be stirred into the prepared emulsion.

The emulsion phase forms the stripe in the product.

Example 12 (Cream Bleach)

	<u>Peroxide Emulsion Phase</u>	%
	Dow Corning Q2 5200	(O) 2.0
5	Light Liquid Paraffin WOM 14	(O) 20.0
	Phosphoric Acid BP	(W) 0.1
	Sodium Stannate	(W) 0.005
	Sodium Chloride	(W) 2.00
	Tetra Sodium Pyrophosphate	(W) 0.002
10	Hydrogen Peroxide Soln (35%)	(W) 16.67
	Preservative	q.s.
	Purified Water	to 100
	<u>Paste Phase</u>	%
	Ammonium Bicarbonate BP	15.0
15	Sodium Bicarbonate BP	6.0
	White Soft Paraffin BP	8.0
	Liquid Paraffin BP	35.5
	Syncrowax HRSC	5.0
	Antaron V216	1.5
20	Tween 20	7.0
	Span 20	5.0
	Bentone Gel M10	15.0
	Titanium Dioxide BP	2.0
	Red No37 D & C	0.002
25	Either phase can form the stripe.	

Example 13 (Hair Dye)

Dyestuff Phase

		%
	Sodium Laureth-2 Sulphate	40.0
	Empilan CME	q.s
5	Empilan E.GMS 2848	q.s
	Sodium Isoascorbate	0.3
	Sodium Metabisulphite BP	2.0
	Sodium Heptonate Dihydrate	0.25
	Methocel J5MS	0.5
10	Fragrance	q.s.
	Dyestuff	q.s.
	Potassium Hydroxide	to pH
	Purified Water	to 100

Emulsion Phase

		%
15	Dow Corning Q2 5200	(O) 2.0
	Light Liquid Paraffin WOM 14	(O) 20.0
	Phosphoric Acid BP	(W) 0.1
	Sodium Stannate	(W) 0.005
	Sodium Chloride	(W) 2.00
20	Tetra Sodium Pyrophosphate	(W) 0.002
	Hydrogen Peroxide Soln (35%)	(W) 16.67
	Preservative	q.s.
	Ethoquad 0/12	1.0
	Antara 430	0.3
25	Purified Water	to 100

The Ethoquad 0/12 and Antara 430 may be stirred into the formed emulsion.

The emulsion phase forms the stripe in the product.

Example 14 (Hair Conditioning Gel)

<u>Gel Phase</u>		%
	Sequestrene Na2	0.05
	Carbopol 940	0.5
5	Uvinul MS 40 Powder	0.02
	Diisopropanolamine Aqueous 90%	0.361
	Polyvinylpyrrolidone K 30-35	1.55
	Volpo 020	1.0
	Perfume Comp SN 11095 Gidan	0.075
10	Preservatives	q.s.
	Purified Water	to 100
<u>Emulsion Phase</u>		%
	Dow Corning Q2 5200	(O) 2.0
	Light Liquid Paraffin WOM 14	(O) 20.0
15	Sodium Chloride	(W) 2.0
	Merquat 100	(W) 1.0
	Preservative	q.s.
	Purified Water	to 100

The emulsion phase forms the stripe in the product.

Example 15 (Antiseptic Liquid Soap)

Surfactant Phase

		%
	Sodium Lauryl Ether Sulphate 2EO	40-45
	Citric Acid	0.05
5	Empilan CDE	2.0
	Tensiorex BND 57	1.0
	Formaldehyde Soln BP	0.035
	Bronopol	0.02
	Colour	q.s.
10	Perfume	q.s.
	Purified Water	to 100

Emulsion Phase

		%
	Dow Corning Q2 5200	(O) 2.0
	Light Liquid Paraffin WOM 14	(O) 20.0
15	Sodium Chloride	(W) 2.0
	Chlorhexidine Gluconate	(W) 0.5
	Preservative	q.s.
	Purified Water	to 100

The two phases form layers in the product.

Example 16 (Clear Conditioning Mascara Gel)

	<u>Gel Phase</u>	%
	Carbopol 940	1.0
	Butylene Glycol	5.0
5	Glycerin	10.0
	Lubrajel MS	10.0
	Luviskol VA 64	5.0
	Empimin OT	0.2
	Potassium hydroxide	0.79
10	Colour	q.s.
	Preservative	q.s.
	Purified Water	to 100
	<u>Emulsion Phase</u>	%
	Dow Corning Q2 5200	(O) 2.0
15	Light Liquid Paraffin WOM 14	(O) 20.0
	Sodium Chloride	(W) 2.0
	Merquat 100	(I) 1.0
	Preservative	q.s.
	Purified Water	to 100

Example 17 (Anti Acne Gel)

	<u>Gel Phase</u>	%
	Carbopol 940	1.0
	Butylene Glycol	2.0
5	Glycerin	1.0
	D-Panthenol 75L	1.5
	Potassium Hydroxide	0.35
	Sequestrene Na4	0.02
	Glucose	1.0.
10	Preservative	q.s.
	Purified Water	to 100
	<u>Emulsion Phase</u>	%
	Dow Corning Q2 5200	(O) 2.0
	Light Liquid Paraffin WOM 14	(O) 20.0
15	Sodium Chloride	(W) 2.0
	Glucose Oxidase P200	(W) 0.025
	Preservative	q.s.
	Purified Water	to 100

The emulsion phase forms the stripe in the product.

Example 18 (Sunscreen Gel)

	<u>Emulsion Phase</u>	%
	Dow Corning Q2 5200 (lauryl methicone Copolyol)	2.0
	Arlacel 986 (Glyceryl sorbitan isostearate)	0.5
5	Light Liquid Paraffin WOM 14	18.0
	Evening Primrose Oil	2.0
	Sodium Chloride	2.0
	Bronopol	0.03
	Parsol MCX	4.0
10	Parsol 1789	3.0
	Microfine Titanium Dioxide	2.0
	Purified Water BP	to 100

The emulsion phase was prepared as described in Example 2. The Parsol MCX, Parsol 1789 and the titanium dioxide were added to the oil phase and the sodium chloride was added to the aqueous phase prior to mixing.

	<u>Gel Phase</u>	%
	Carbopol 940	1.0
20	Methyl Hydroxybenzoate	0.15
	Butylene Glycol	2.0
	Glycerin	1.0
	D-Panthenol 75L	1.5
	Bronopol	0.03
25	Potassium Hydroxide	0.35
	Lusantan 25	5.0
	Denatured Ethanol	5.0
	FD & C Orange No. 4 1% solution	0.1
	Sequestrene Na4	0.02
30	Purified Water BP	to 100

The gel phase was prepared as described in Example 1 except that after Stage 4 the Lusantan 25, denatured ethanol and FD and C Orange No. 4 solution were added respectively, with stirring, before making up to the
5 weight.

The emulsion phase may form the stripe.

The ratio of the emulsion phase to the carrier phase may vary according to the cosmetic effect required and the desired visual appearance and may lie
10 in the range 99:1 to 1:99. In illustrative examples, products were prepared in which the ratio of cosmetic carrier to emulsion phase in Examples 1-4 was 4:1 and Example 2 was also formulated in a ratio of 1:4.

Claims

1. A cosmetic formulation comprising a cosmetically acceptable carrier immiscibly combined with a water-in-oil emulsion comprising an aqueous phase dispersed within an oil phase by means of an emulsifying agent wherein a component capable of interaction with an ingredient of the carrier is incorporated within the aqueous phase of the emulsion.
5
2. A cosmetic formulation as claimed in claim 1 in which the oil phase of the water-in-oil emulsion comprises one or more cosmetically acceptable oils selected from vegetable oils, synthetic esters, mineral oils, volatile silicone oils and non-volatile silicone oil.
10
3. A cosmetic formulation as claimed in claim 2 in which the oil phase comprises 10-90% of the water-in-oil emulsion.
15
4. A cosmetic formulation as claimed in claim 3 in which the oil phase comprises 20-40% of the water-in-oil emulsion.
20
5. A cosmetic formulation as claimed in any preceding claim in which the water content of the water-in-oil emulsion comprises 10-90%.
6. A cosmetic formulation as claimed in claim 5 in which the water content of the water-in-oil emulsion comprises 60-80%.
25
7. A cosmetic formulation as claimed in any preceding claim in which the emulsifying agent for the water-in-oil emulsion comprises one or more emulsifiers

selected from a polysiloxane-polyalkyl-polyether copolymer, an ethoxylated fatty acid ester, a fatty acid phosphate, a sorbitan fatty acid ester, an ethoxylated hydrogenated castor oil, a fatty acid ester of a polyalcohol, a glyceryl sorbitan fatty acid ester or PPG-3 myristylether.

- 5 8. A cosmetic formulation as claimed in claim 7 in which the emulsifier comprises a polysiloxane-polyalkyl-polyether copolymer.
- 10 9. A cosmetic formulation as claimed in claim 8 in which the emulsifier comprises laurylmethicone copolyol.
- 15 10. A cosmetic formulation as claimed in any preceding claim in which the emulsifying agent comprises 0.5-15% of the water-in-oil emulsion.
11. A cosmetic formulation as claimed in claim 10 in which the emulsifying agent comprises 1-3% of the water-in-oil emulsion.
- 20 12. A cosmetic formulation as claimed in any preceding claim in which the cosmetic carrier comprises an aqueous gel comprising water and a gelling agent.
- 25 13. A cosmetic formulation as claimed in claim 12 in which the gelling agent is selected from: a carboxyvinyl polymer in combination with a neutralising agent; sodium magnesium silicate; polyglycerylmethacrylate; and a gel-forming gum.
14. A cosmetic formulation as claimed in claim 13 in which the gelling agent is a carboxyvinyl polymer in combination with a neutralising agent.

15. A cosmetic formulation as claimed in claim 14 in which the neutralising agent is selected from an inorganic base or an organic base.

16. A cosmetic formulation as claimed in claim 15 in
5 which the neutralising agent is potassium hydroxide.

17. A cosmetic formulation as claimed in any one of claims 12-16 in which the gelling agent comprises 0.01-30% of the cosmetic carrier.

18. A cosmetic formulation as claimed in claim 17 in
10 which the gelling agent comprises 0.5-3% of the cosmetic carrier.

19. A cosmetic formulation as claimed in any one of claims 1 to 11 in which the cosmetic carrier comprises an oil-in-water emulsion comprising an oil phase, water
15 and an emulsifying agent.

20. A cosmetic formulation as claimed in claim 19 in which the oil phase comprises one or more cosmetically acceptable oils selected from a vegetable oil, a synthetic ester and a mineral oil and may optionally contain a volatile silicone oil or a non-volatile silicone oil.
20

21. A cosmetic formulation as claimed in claim 20 in which the oil content of the oil-in-water emulsion comprises 1-70%.

25 22. A cosmetic formulation as claimed in claim 21 in which the oil content of the oil-in-water emulsion comprises 25-45%.

23. A cosmetic formulation as claimed in any one of claims 19-22 in which the emulsifying agent for the

oil-in-water emulsion comprises one or more emulsifiers selected from a fatty acid ester, an ethoxylated fatty acid ester, an ethoxylated fatty alcohol, a fatty acid quaternary ammonium salt and a salt of a fatty acid.

- 5 24. A cosmetic formulation as claimed in claim 23 in which the emulsifying agent comprises 0.1-20% of the oil-in-water emulsion.
- 10 25. A cosmetic formulation as claimed in claim 24 in which the emulsifying agent comprises 1-5% of the oil-in-water emulsion.
26. A cosmetic formulation as claimed in any one of claims 1 to 11 which the cosmetic carrier comprises an anhydrous paste.
- 15 27. A cosmetic carrier as claimed in claim 26 in which the anhydrous paste comprises a cosmetically acceptable oil, an oil thickening agent, at least one water-soluble component suspended in said oil and at least one wetting agent.
- 20 28. A cosmetic formulation as claimed in any one of claims 1-11 in which the cosmetic carrier comprises an anionic surfactant phase.
29. A cosmetic formulation as claimed in claim 28 in which the anionic surfactant phase comprises an anionic surfactant, water and a thickening agent.
- 25 30. A cosmetic formulation as claimed in claim 29 in which the anionic surfactant is selected from a salt of an ethoxylated fatty alcohol sulphate and a salt of an alkyl sulphate.

31. A cosmetic formulation as claimed in claim 30 in which the anionic surfactant comprises 0.1-25% of the anionic surfactant phase.
- 5 32. A cosmetic formulation as claimed in claim 31 in which the anionic surfactant comprises 5-15% of the surfactant phase.
33. A cosmetic formulation as claimed in any one of claimed 28-32 in which the thickening agent is selected from a salt, a alkanolamide and an ethoxylated alcohol.
- 10 34. A cosmetic formulation as claimed in claim 33 in which the thickening agent comprises 0.5-5% of the anionic surfactant phase.
- 15 35. A cosmetic formulation as claimed in any preceding claim in which the ratio of the water-in-oil emulsion to cosmetic carrier is in the range 99:1 to 1:99.
36. A cosmetic formulation as claimed in any preceding claim in which the ratio of the water-in-oil emulsion to cosmetic carrier is in the range 75:1 to 1:75.
- 20 37. A cosmetic formulation as claimed in any preceding claim in which the ratio of the water-in-oil emulsion to cosmetic carrier is in the range 25:1 to 1:25.
- 25 38. A cosmetic formulation as claimed in any preceding claim in which the component capable of interaction is selected from: a salt, a cationic conditioner and an ultraviolet absorber.
39. A cosmetic formulation as claimed in any preceding claim in which the component and the ingredient which are capable of interaction are selected from the following pairs: an oxidising agent and a reducing

agent; an enzyme and its substrate, an acid and a base; the components of an effervescent couple; an anionic surfactant and a cationic conditioner; and an oxidising agent and dyestuff.

5 40. A process for the preparation of formulations according to claim 1 wherein the cosmetic carrier and the water-in-oil emulsion are combined by admixing to form an immiscible mixture.

10 41. A method of formulating a cosmetic composition comprising a cosmetically acceptable carrier and a water-in-oil emulsion comprising an aqueous phase, an oil phase, an emulsifying agent and a component capable of interaction with an ingredient of the carrier wherein the component capable of interaction with the 15 ingredient of the carrier is incorporated in the aqueous phase of the emulsion and further wherein the emulsion is immiscibly combined with the carrier.

42. A cosmetic composition substantially as hereinbefore described with reference to the Examples.

